

REMARKS/ARGUMENTS

Upon entry of this amendment, claims 22 to 25 and 27 to 30 are pending in the application

In this amendment, claims 21 and 26 have been canceled without prejudice, claims 22 and 27 have been amended so as to rewrite claims 22 and 27 in independent form, and claims 23, 25, 28, and 30 have been amended so as to change the claim dependencies thereof.

Herein, support for this amendment is found in, for example, the descriptions at lines 24 to 31 on page 6, lines 20 – 24 on page 9, lines 9 – 12 on page 14, lines 5 – 9 and 13 – 17 on page 18, and line 8 on page 32 to line 18 on page 35 of the specification as originally filed and the depictions of figures 1B and 1D of the drawings as originally filed.

Thus, no new matter has been added by this amendment.

Furthermore, this amendment is made to present rejected claims in a better form for consideration on appeal.

Accordingly, entry of this amendment and favorable reconsideration of the application is respectfully requested.

In addition, acknowledgement of the priority document receipt, official consideration of the Information Disclosure Statement (IDS), and approval of the drawings are respectfully requested.

Claim Rejections - 35 USC 103 -

The examiner states that claims 21 – 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohanty (US2003/0216496) in view of Maxfield (WO 93/11190).

In the above-mentioned amendment, claims 21 and 26 have been canceled and claims 22, 23, 25, 27, 28, and 30 have been amended.

Claims 22 to 25

Claims 22 to 25 are patentable over the cited Mohanty and Maxfield references at least for the following reasons.

With respect to independent claim 22, none of Mohanty and Maxfield discloses or suggests at least the feature of “wherein the substituted silyl group further comprises a substituent selected from the group consisting of an amino group, an epoxyethyl group, an epoxyethyloxy group, a vinyl group, an isopropenyl group, a 1-phenylvinyl group, a 4-vinylphenyl group, an isocyanate group, and a hydroxyl group and the substituent directly bonds to a silicon atom of the substituted silyl group, and wherein the number of carbon atoms in the alkyl group is 3 or greater and 18 or less” as recited in claim 22.

In the “Response to Argument” in paragraph 5 of the office action, first, the examiner argues that claim 21 does not mandatorily require the presence of a substituted alkyl group and Maxfield clearly teaches the use of non-substituted alyl groups (but the term “alyl” group written in the office action is unclear.).

The examiner has erroneously construed a claimed feature of “wherein the substituted silyl group further comprises a substituent selected from the group consisting of . . . and the substituent directly bonds to a silicon atom of the substituted silyl group” as limiting a claimed feature of “a substituted or non-substituted alkyl group”.

However, claim 22 recites “the substituted silyl group bonding to the layered silicate and comprising a substituted or non-substituted alkyl group” and “wherein the

substituted silyl group further comprises a substituent selected from the group consisting of an amino group, an epoxyethyl group, an epoxyethyloxy group, a vinyl group, an isopropenyl group, a 1-phenylvinyl group, a 4-vinylphenyl group, an isocyanate group, and a hydroxyl group and the substituent directly bonds to a silicon atom of the substituted silyl group” (emphasis added). Thus, in claim 22, “the substituted silyl group” “comprising a substituted or non-substituted alkyl group” “further comprises a substituent selected from the group consisting of . . . and the substituent directly bonds to a silicon atom of the substituted silyl group”. That is, “a substituted or non-substituted alkyl group” as recited in claim 22 is clearly independent of “a substituent selected from the group consisting of . . . and the substituent directly bonds to a silicon atom of the substituted silyl group” as recited in claim 22. In other words, “a substituent selected from the group consisting of . . . and the substituent directly bonds to a silicon atom of the substituted silyl group” as recited in claim 22 is not provided for “a substituted or non-substituted alkyl group” as recited in claim 22 but for “the substituted silyl group” as recited in claim 22. Accordingly, an argument with respect to “a substituted or non-substituted alkyl group” as recited in claim 22 is also independent of the feature of “the substituent directly bonds to a silicon atom of the substituted silyl group” as recited in claim 22 and provides no basis of the claim rejection under 35 U.S.C. 103 (a).

In the “Response to Argument” in paragraph 5 of the office action, second, the examiner argues that the limitation “directly bonds” does not exclude Maxfield’s “R³” linking group because the groups as claimed do not exclude linking groups, and for instance, an “amino group” reads on groups other than -NH₂ such as alkylamino.

The applicants respectfully disagree with the examiner.

Specifically, claim 22 recites “a substituent selected from the group consisting of an amino group, an epoxyethyl group, an epoxyethyloxy group, a vinyl group, an isopropenyl group, a 1-phenylvinyl group, a 4-vinylphenyl group, an isocyanate group, and a hydroxyl group” and “the substituent directly bonds to a silicon atom of the substituted silyl group”. Thus, in claim 22, “a substituent selected from the group consisting of an amino group, . . . and a hydroxyl group” “directly bonds to a silicon atom of the substituted silyl group”. That is, claim 22 indicates that there is no divalent or linking group between “a substituent selected from the group consisting of an amino group, . . . and a hydroxyl group” and “a silicon atom of the substituted silyl group”. Hence, the features of “a substituent selected from the group consisting of an amino group, . . . and a hydroxyl group” and “the substituent directly bonds to a silicon atom of the substituted silyl group” as recited in claim 22 excludes a divalent or linking group, such as “-R³-” disclosed in Maxfield, between “a substituent selected from the group consisting of an amino group, . . . and a hydroxyl group” and “a silicon atom of the substituted silyl group” as recited in claim 22. Also, the features of “a substituent selected from the group consisting of an amino group, . . . and a hydroxyl group” and “the substituent directly bonds to a silicon atom of the substituted silyl group” as recited in claim 22 excludes a group other than “an amino group, . . . and a hydroxyl group”, such as alkylamino group.

In the “Response to Argument” in paragraph 5 of the office action, third, the examiner argues that Maxfield discloses the use of a swelling/compatibilizing agent with groups such as an amine and vinyl (page 14, lines 30-31) and a vinyl group such as allyltrimethoxysilane (page 19, line19).

However, claim 22 recites “the substituted silyl group . . . comprising a substituted or non-substituted alkyl group” and “wherein the number of carbon atoms in the alkyl group is 3 or greater and 18 or less”. Herein, none of “-NH₂, -CH₂-X (where X is Cl, Br or I), -CH₂=CH₂, -SH, S⁺M⁺ (where M⁺ is a metal cation such as Na⁺, Li⁺, and K⁺) and S₄H” described at lines 30 to 33 on page 14 of Maxfield corresponds to the feature of “a substituted or non-substituted alkyl group” “wherein the number of carbon atoms in the alkyl group is 3 or greater and 18 or less” as recited in claim 22. Accordingly, the description of “silanes containing functions such as -NH₂, -CH₂-X (where X is Cl, Br or I), -CH₂=CH₂, -SH, S⁺M⁺ (where M⁺ is a metal cation such as Na⁺, Li⁺, and K⁺) and S₄H” at lines 30 to 33 on page 14 of Maxfield fails to disclose or suggest at least the feature of “the substituted silyl group . . . comprising a substituted or non-substituted alkyl group” “wherein the number of carbon atoms in the alkyl group is 3 or greater and 18 or less” as recited in claim 22.

Furthermore, Maxfield describes “reactive organo silane swelling/compatibilizing agent of the formula: X_nSiR_(4-n-m)(R¹)_m where R and R¹ are as described above and X is a leaving group which is displaceable by or reactive with oxide functions on the surface of said layers such as halo, alkoxy, acyloxy, amine and the like” at lines 22 to 31 on page 18. However, no definition of “m” or “n” in “the formula X_nSiR_(4-n-m)(R¹)_m” is provided in the Maxfield, and accordingly, “reactive organo silane swelling/compatibilizing agent of the formula: X_nSiR_(4-n-m)(R¹)_m” described in Maxfield is unclear.

Furthermore, it appears that Maxfield describes “reactive organo silane swelling/compatibilizing agent of the formula: X_nSiR_(4-n-m)(R¹)_m where R and R¹ are as described above and X is a leaving group which is displaceable by or reactive with oxide

functions on the surface of said layers such as halo, alkoxy, acyloxy, amine and the like” at lines 22 to 31 on page 18 for providing “silane agents of the formula: $(-)_n \text{SiR}_{(4-n-m)}\text{R}^1_m$ where $(-)$ is a covalent bond to the surface of the layer, m is 0, 1, or 2; n is 1, 2, or 3 with the proviso that the sum of m and n is equal to 3; R^1 is . . . ; R is . . . ” at line 32 on page 10 to line 12 on page 11 of Maxfield. Herein, “silane agents of the formula: $(-)_n \text{SiR}_{(4-n-m)}\text{R}^1_m$ where $(-)$ is a covalent bond to the surface of the layer, . . . ” at line 32 on page 10 to line 12 on page 11 of Maxfield provided by “reactive organo silane swelling/compatibilizing agent of the formula: $\text{X}_n\text{SiR}_{(4-n-m)}(\text{R}^1)_m$ where . . . ” at lines 22 to 31 on page 18 fail to disclose or suggest at least the feature of “the substituted silyl group bonding to the layered silicate” and “the substituted silyl group further comprises a substituent selected from the group consisting of an amino group, an epoxyethyl group, an epoxyethyloxy group, a vinyl group, an isopropenyl group, a 1-phenylvinyl group, a 4-vinylphenyl group, an isocyanate group, and a hydroxyl group and the substituent directly bonds to a silicon atom of the substituted silyl group” as recited in claim 22, because none of “ $(-)$ ”, “ R ”, and “ R^1 ” described at line 34 on page 10 to line 12 on page 11 of Maxfield disclose or suggest at least the feature of “a substituent selected from the group consisting of an amino group, an epoxyethyl group, an epoxyethyloxy group, a vinyl group, an isopropenyl group, a 1-phenylvinyl group, a 4-vinylphenyl group, an isocyanate group, and a hydroxyl group” as recited in claim 22. Accordingly, the description of “reactive organo silane swelling/compatibilizing agent of the formula: $\text{X}_n\text{SiR}_{(4-n-m)}(\text{R}^1)_m$ where R and R^1 are as described above and X is a leaving group which is displaceable by or reactive with oxide functions on the surface of said layers such as halo, alkoxy, acyloxy, amine and the like” at lines 22 to 31 on page 18 fails to disclose or suggest at least the feature of “the substituted silyl group bonding to the layered silicate” and “the substituted silyl

group further comprises a substituent selected from the group consisting of an amino group, . . . and a hydroxyl group and the substituent directly bonds to a silicon atom of the substituted silyl group” as recited in claim 22.

Moreover, the description of “allyltrimethoxysilane” at line 19 on page 19 of Maxfield fails to disclose or suggest at least the feature of “the substituted silyl group further comprises a substituent selected from the group consisting of an amino group, an epoxyethyl group, an epoxyethyloxy group, a vinyl group, an isopropenyl group, a 1-phenylvinyl group, a 4-vinylphenyl group, an isocyanate group, and a hydroxyl group and the substituent directly bonds to a silicon atom of the substituted silyl group” or “the number of carbon atoms in the alkyl group is 3 or greater and 18 or less” as recited in claim 22, because none of “allyl” and “methoxy” in “allyltrimethoxysilane” at line 19 on page 19 of Maxfield corresponds to the feature of “a substituent selected from the group consisting of an amino group, an epoxyethyl group, an epoxyethyloxy group, a vinyl group, an isopropenyl group, a 1-phenylvinyl group, a 4-vinylphenyl group, an isocyanate group, and a hydroxyl group” wherein “the substituent directly bonds to a silicon atom of the substituted silyl group” as recited in claim 22 or the feature of “the number of carbon atoms in the alkyl group is 3 or greater and 18 or less” as recited in claim 22.

Therefore, claim 22 as well as claims 23, 24, and 25 depending therefrom directly or indirectly are not obvious over the Mohanty and Maxfield references even for those skilled in the art at the time of the claimed invention.

Claims 27 to 30

Claims 27 to 30 are patentable over the cited Mohanty and Maxfield referenced at least for the following reasons.

With respect to independent claim 27, none of Mohanty and Maxfield discloses or suggests at least the feature of “the substituent comprises a non-substituted second alkyl group, and wherein the total of the number of carbon atoms in the first alkyl group and the number of carbon atoms in the second alkyl group is 3 or greater and 18 or less” as recited in claim 27.

In the “Response to Argument” in paragraph 5 of the office action, the examiner argues that amide and ester groups on page 44, lines 1 – 10 are representative of Z^1 and Maxfield discloses aliphatic R^3 groups on page 44, lines 2 – 4.

Herein, “ $-R^2-$ is an aromatic or aliphatic moiety of the formula: $-R^3Z^1-$ wherein $-R^3-$ is . . . ; and $-Z^1-$ is . . .” described at line 33 on page 43 to line 13 on page 44 of Maxfield cites a feature of “ $-R^2-$ is a divalent organic chain which bonds the silicon atom to a polymer component of the polymer matrix” described at lines 28 to 30 on page 44 of Maxfield. That is, “an aromatic or aliphatic moiety of the formula: $-R^3Z^1-$ wherein $-R^3-$ is . . . ; and $-Z^1-$ is . . .” described at line 33 on page 43 to line 13 on page 44 of Maxfield is also “a divalent organic chain which bonds the silicon atom to a polymer component of the polymer matrix” described at lines 28 to 30 on page 44 of Maxfield.

However, “a polymer component of the polymer matrix” described at lines 29 to 30 on page 44 of Maxfield does not correspond to the feature of “a non-substituted second alkyl group” “wherein the total of the number of carbon atoms in the first alkyl group and the number of carbon atoms in the second alkyl group is 3 or greater and 18 or less” as recited in claim 27. Accordingly, “an aromatic or aliphatic moiety of the formula: $-R^3Z^1-$ wherein $-R^3-$

is . . . ; and -Z¹- is . . .” described at line 33 on page 43 to line 13 on page 44 of Maxfield, “which bonds the silicon atom to a polymer component of the polymer matrix” described at lines 28 to 30 on page 44 of Maxfield, fails to disclose or suggest at least the feature of “the substituent comprises a non-substituted second alkyl group, and wherein the total of the number of carbon atoms in the first alkyl group and the number of carbon atoms in the second alkyl group is 3 or greater and 18 or less” as recited in claim 27.

Therefore, claim 27 as well as claims 28, 29, and 30 depending therefrom directly or indirectly are not obvious over the Mohanty and Maxfield references even for those skilled in the art at the time of the claimed invention.

Consequently, withdrawal of the claim rejection under 35 U.S.C. 103 is respectfully requested.

Double Patenting Rejection

Claims 21 to 30 are provisionally rejected on the ground of nonstatutory obvious-type double patenting as being unpatentable over claim 3 of copending application No. 11/628,625. In the above-mentioned amendment, claims 21 and 26 have been canceled and claims 22, 23, 25, 27, 28, and 30 have been amended. As a result, the claim rejection under 35 U.S.C. 103 is overcome as mentioned above, and accordingly, the provisional obviousness-type double patenting rejection is the only rejection remaining in the present application. Furthermore, the present application (Serial No. 10/580,336) is an earlier-filed application while the copending application (Serial No. 11/628,625) is a later-filed application. Therefore, withdrawal of the provisional obvious-type double patenting

rejection is respectfully requested. (Please refer to the MPEP 804 – B – 1, ‘Nonstatutory Double Patenting Rejections’.)

Conclusion

In view of the foregoing, the present application is believed to be in condition for allowance and an early indication to that effect is earnestly solicited.

The Commissioner is authorized to charge any fees to Deposit Account No. 50-4424.

Respectfully submitted,

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